California Monthly Climate Summary
March 2013

Weather Highlights

March 2013 was a warm and dry month for California. According to the Western Region Climate Center's California Climate Tracker, the monthly average temperature was 51.9°F which is 4°F higher than the long-term average of 47.9°F. This was the 8th warmest March since 1895. With a statewide average of 1.17 inches, precipitation in March was only 37% of average. While this is only the 18th driest March in the California Climate Tracker record, this is the driest January to March with a total of 2.70 inches of precipitation. The mean for this period is 11.12 inches. Regional maximum and minimum temperature and precipitation plots for the January through March time period are shown at the end of the document.

March started with high pressure and above normal temperatures covering most of the State. Weak disturbances during the first week brought light showers to the North Coast part of the State and across Northern California at the end of the week. In the second week, high pressure dominated the State with temperatures reaching the 90s in some locations. A low pressure system moving in at the end of the week managed to cool temperatures a bit. In the third week a low pressure system came in from the Pacific bringing rain and cooler temperatures to north and central part of the State. Higher elevations received up to a foot of snow. Windy conditions followed with temperatures moving back above normal. The month closed out with a slow moving storm system coming ashore bringing rainfall that extended down to Santa Barbara. Some areas received over 2 inches of rain. Thunderstorms popped up in the interior sections of the State.

Preliminary records, reported on the National Weather Service Record Event Report, show that statewide there were 94 temperature records tied or broken and 4 precipitation records tied for the month. Of the 94 temperature records set, 58 were for new high maximum temperatures and 27 were for new high minimum temperatures. Records were set over 20 days of the month. On March 16th Death Valley reached 100°F which ties the earliest date of reaching the 100 degree mark. In 2007 on March 16th, Death Valley reached 102°F which remains the daily high temperature record. On March 1st, temperature records were set across the State. Santa Cruz broke a 1925 record with a high temperature reading of 81°F. The old daily record high was 77°F. Laguna Beach broke a 1936 record for high minimum temperature with a reading of 61°F. The old record was 60°F.

For the California Data Exchange Center's (CDEC) network of temperature gages used in this report, 176 stations recorded a minimum temperature below freezing in March while zero stations reached or exceeded 100°F at least once during the month. Statewide extremes from the CDEC network of temperature gages are shown below. Also shown are the monthly average extremes from the CIMIS network. A table of regional average minimum, mean, and maximum temperatures from the CDEC stations is also shown at the end of the summary.

Precipitation in March was below average across the State. For the CDEC precipitation gages, the largest amount of precipitation recorded for the month was at Gasquet Ranger Station in the North Coast region with 6.19 inches. This is only 84% of the average precipitation for this station for the month. At the other end of the spectrum, 3 stations recorded no precipitation for the month. For the CIMIS network, Durham in Butte County topped the precipitation charts with 3.46 inches for the month and 9 stations recorded no precipitation. Some CIMIS gages may show large precipitation totals if the gages are not covered during irrigation activities so care should be given to review precipitation data used from this network.

The 8-Station Index for northern California precipitation recorded 4.3 inches in March. On average, 6.9 inches of precipitation is recorded for the 8-Station index for the month. For the combined January to March total, the 8-Station Index is 6.5 inches which is the lowest Jan-Mar total in the period of record which dates back to water year 1921. The previous record was 8.37 inches set in 1923. Statewide, the average precipitation for the month was 47.67% of the long-term average based on the California Data Exchange Center (CDEC) gages. Precipitation percentages by region from the CDEC gages are shown in a table at the end of this document.

CoCoRaHS Update

March 2013 continues California's fifth year with CoCoRaHS – the Community Collaborative Rain, Hail and Snow Network. This group uses citizen volunteers to record rain, hail and snow data. The users enter the data online at the CoCoRaHS web site. The web site provides the opportunity to see spatial detail of rain and snow patterns. A map from March 20, 2013 is shown at the end of the document. As of the end of March, California has 1025 volunteers signed up spanning 53 of California's 58 counties. The counties without volunteers are Alpine, Colusa, Glenn, Modoc, and Tuolumne. The county with the most volunteers at the end of March is Sonoma with 98 volunteers. San Diego County is close behind with 89 volunteers. For the month of March, 11,747 reports were recorded for California. The largest daily rain total for CoCoRaHS- CA in March was in Humboldt County where 4.45 inches was recorded on 03/6/2013. There were 49 snowfall reports recorded with the largest being 16 inches in Siskiyou County. The largest total depth of snow reported in March was 67 inches in Placer County. Five hail reports were submitted in March in Placer (3), and Nevada (2) counties. The largest stone size reported was 3/8" sized. To join CoCoRaHS or find more information, please visit http://www.cocorahs.org.

Snowpack and Water Supply Conditions

At the end of March the Northern region snowpack held 14 inches of snow water equivalent (SWE) which is 49% of the April 1st average. The Central region SWE was reported to be 17 inches which is 54% of the April 1st average. The Southern region SWE was reported to be 9 inches which is 35% of the April 1st average. The Water Supply Index (WSI) for WY2012 for the Sacramento Basin fell into the below normal category and the San Joaquin fell into the dry category. The median forecast for the WSI for the Sacramento Basin is dry and critical for the San Joaquin Basin. Further

information can be found at http://cdec.water.ca.gov/water_supply.html. A historical listing of water year categories for both basins can be found at http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST.

Extreme Precipitation Monitoring Network

The National Oceanographic and Atmospheric Administration (NOAA) Earth System Research Laboratory (ESRL), Scripps Institute of Oceanography, and the California Department of Water Resources have been working on the installation of new observing equipment to monitor characteristics of extreme precipitation events associated with atmospheric rivers. Initial data is starting to flow from this network. No extreme precipitation events occurred in March 2013 where the network components are installed. Data can be viewed on the NOAA ESRL website: http://hmt.noaa.gov and will be available later this year on the California Data Exchange Center.

Drought Monitor and Seasonal Outlook

The maps for California for February 26, 2013 and March 26, 2013 are shown below. The Drought Monitor maps can be found on the National Drought Mitigation Center's (NDMC) website http://drought.unl.edu/dm/. These maps are largely a reflection of precipitation and soil moisture deficit estimates. As of the March 26th depiction, 24.22% of California is depicted in the D2 or severe drought category, 24.16% of California is depicted in the D1 or moderate drought category. An additional 51.62% of the state is depicted as D0 or abnormally dry. Maps are updated weekly.

The U.S. Seasonal Drought Outlook for April through June from NOAA depicts California in persisting or developing drought throughout most of the state. This forecast is based primarily on climatology and forecast models. Maps and information can be found at http://www.cpc.noaa.gov/products/expert_assessment/seasonal_drought.html. Updates are provided twice per month.

For more information on water conditions in California, visit http://www.water.ca.gov/waterconditions/. A table showing end-of-month reservoir storage by hydrologic region is shown at the end of this document.
.

ENSO Conditions and Long-Range Outlooks

The El Niño/Southern Oscillation (ENSO) is currently in neutral conditions. Equatorial sea surface temperature anomalies for the tropical Pacific have been mostly negative with values of -0.1°C in the Niño 3.4 at the end of March. The January through March 3-month running mean of the Ocean Niño Index (ONI) is -0.7. This is the second ONI value to be below the threshold of -0.5. Five consecutive ONI values need to be below the threshold o f -0.5 for conditions to be classified as a La Niña event (five consecutive values above the 0.5 threshold need to be observed for classification as an El Niño event). Most forecast models have the tropical sea surface remaining near

neutral conditions for the rest of the calendar year. More information can be found at the Climate Prediction Center's web site:
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/
Updates are posted weekly. The latest three month outlook (April through June) from NOAA indicates equal chances of above or below normal temperatures for the State with the exception of the southeastern deserts which have a higher probability of above normal conditions. For precipitation, a higher probability of below normal conditions is forecast for the entire State. Outlook plots and discussions can be fount at http://www.wrcc.dri.edu/longrang/. General weather information of interest can be found at http://www.noaawatch.gov/. For anomaly information please see http://www.wrcc.dri.edu/anom/cal_anom.html.

Agricultural Data

March 2013 saw crops planted, crops developing, trees bloom, and irrigation employed to offset dry conditions. Citrus, asparagus, and avocado harvests continued while olive orchards were pruned. Cherries, peaches, pistachios, and blueberries bloomed and grapes, apples, and pears were leafing out. Almond bloom completed and nutlets formed. The first planting of summer vegetables began. Cool season vegetables were harvested. Range conditions were reported as fair and supplemental feeding continued. Bees were active as weather allowed. For further crop information see http://www.nass.usda.gov/index.asp.

Other Climate Summaries

California Climate Tracker (new product of Western Region Climate Center)
Golden Gate Weather Service Climate Summary
NOAA Monthly State of the Climate Report

Statewide Extremes (CDEC)

High Temperature – 99°F (Buttercup and Cahuilla, Colorado River Desert)
Low Temperature – -2°F (Charlotte Lake, Tulare)
High Precipitation – 6.19 inches (Gasquet Ranger Station, North Coast)
Low Precipitation – 0.0 inches (7 stations)

Statewide Extremes (CIMIS)

High Average Maximum Temperature – 86.7^0F (Salton Sea East, Imperial County)
Low Average Minimum Temperature – 23.8^0F (Tulelake FS, Siskiyou County)
High Precipitation – 3.46 inches (Durham, Butte County)*
Low Precipitation – 0 inches (9 stations)
*Sometimes irrigation water from sprinklers gets counted as precipitation if the gage is not covered.

Statewide Precipitation Statistics

Hydrologic Region	Region Weight	Basin Reporting			Stations Reporting			% of Historic Average	
		Basins	Mar	Oct-Mar	Stations	Mar	Oct-Mar	Mar	Oct-Mar
North Coast	0.27	5	5	5	15	10	9	25.3%	83%
SF Bay	0.03	3	2	2	6	2	2	20.9%	84%
Central Coast	0.06	5	4	4	10	6	6	32.0%	57%
South Coast	0.06	5	5	5	14	12	12	35.9%	49%
Sacramento River	0.26	10	9	9	42	34	33	53.2%	87%
San Joaquin River	0.12	7	7	7	26	24	18	41.6%	74%
Tulare Lake	0.07	5	5	5	27	27	27	29.7%	59%
North Lahontan	0.04	6	6	6	13	11	10	33.1%	77%
South Lahontan	0.06	5	5	5	14	8	8	86.4%	53%
Colorado River	0.03	2	2	2	6	4	4	20.8%	55%
Statewide Weighted Average	1	53	50	50	173	138	129	47.7%	74.8%

Statewide Mean Temperature Data by Hydrologic Region (degrees F)

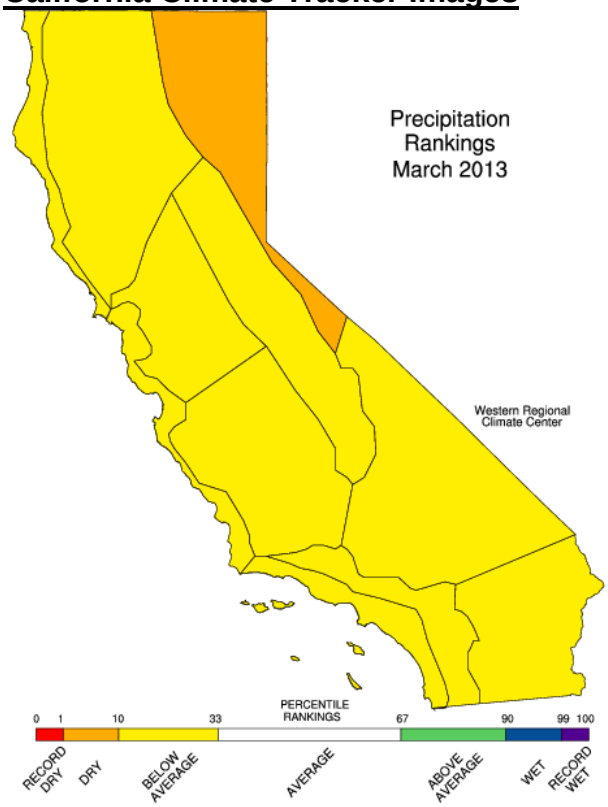
Hydrologic Region	No. Stations	Minimum	Average	Maximum
North Coast	20	24.9	44.6	70.7
SF Bay	9	35.7	52.9	72.3
Central Coast	12	32.9	54.1	82.8
South Coast	39	36.1	57.3	86.9
Sacramento	73	26.6	47.0	72.5
San Joaquin	45	25.3	45.2	72.2
Tulare Lake	17	19.1	40.2	66.4
North Lahontan	24	15.2	36.9	61.2
South Lahontan	12	19.3	43.6	69.9
Colorado River Desert	7	43.4	68.1	94.4
Statewide Weighted Average	258	26.3	46.9	73.1

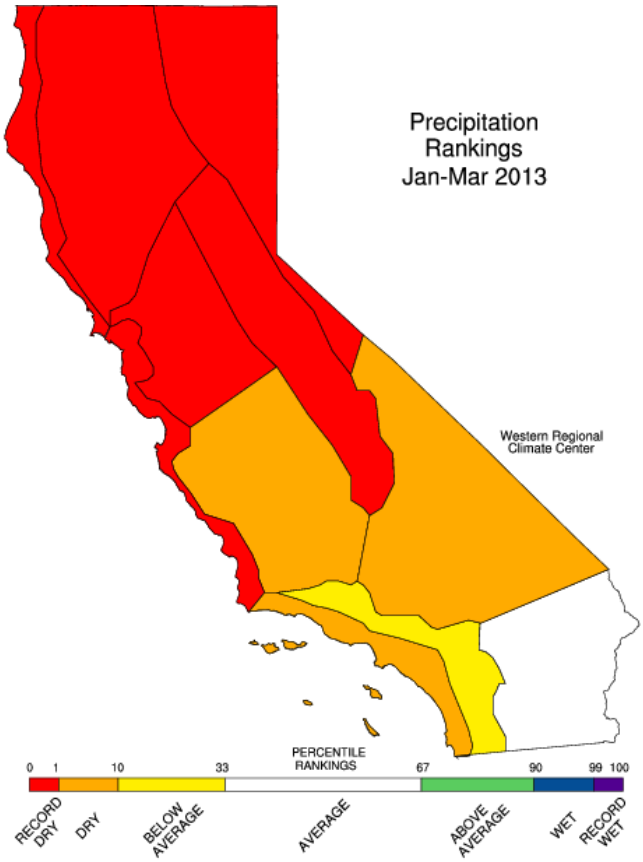
End-of-March Reservoir Storage by Hydrologic Region

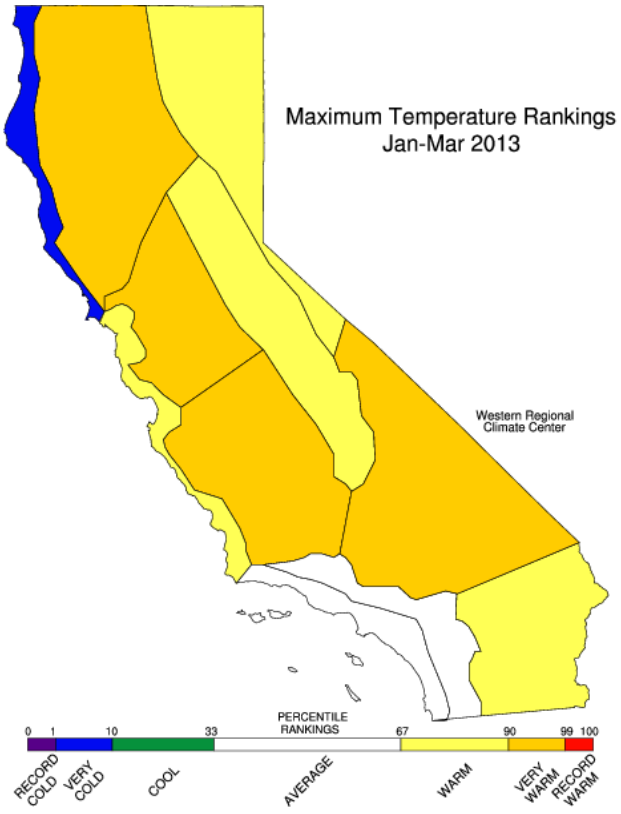
Storage in Thousand Acre-Feet (taf)

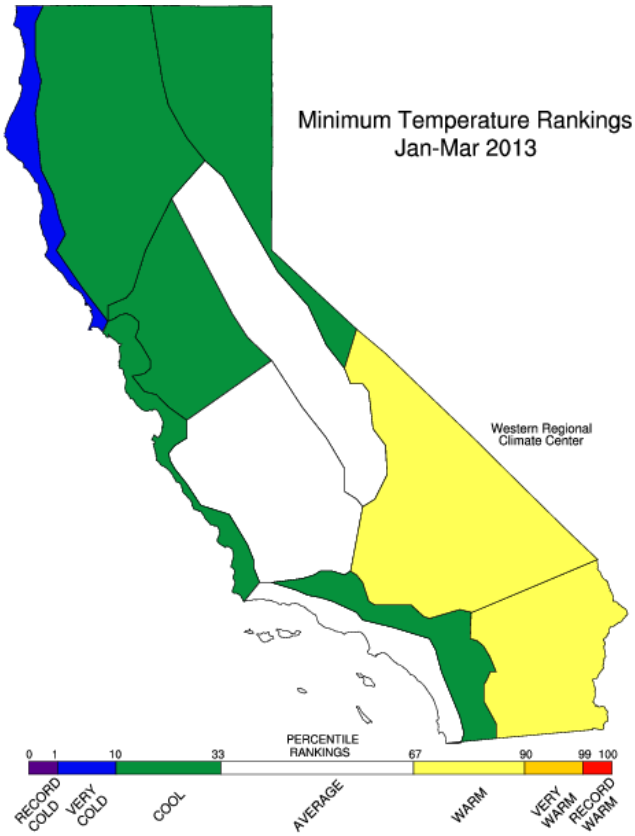
End-of-March Reservoir Storage	Number of Reservoirs	Average Storage (taf)	2013 Storage (taf)	% of Average
North Coast	6	2,359	2,474	105%
San Francisco Bay	17	526	441	84%
Central Coast	6	701	527	75%
South Coast	29	1,509	1,242	82%
Sacramento	43	12,243	12,746	104%
San Joaquin	34	7,537	7,150	95%
Tulare	6	915	609	67%
North Lahontan	5	547	576	105%
South Lahontan	8	267	248	93%
Total	154	26,607	26,017	98%

California Climate Tracker Images

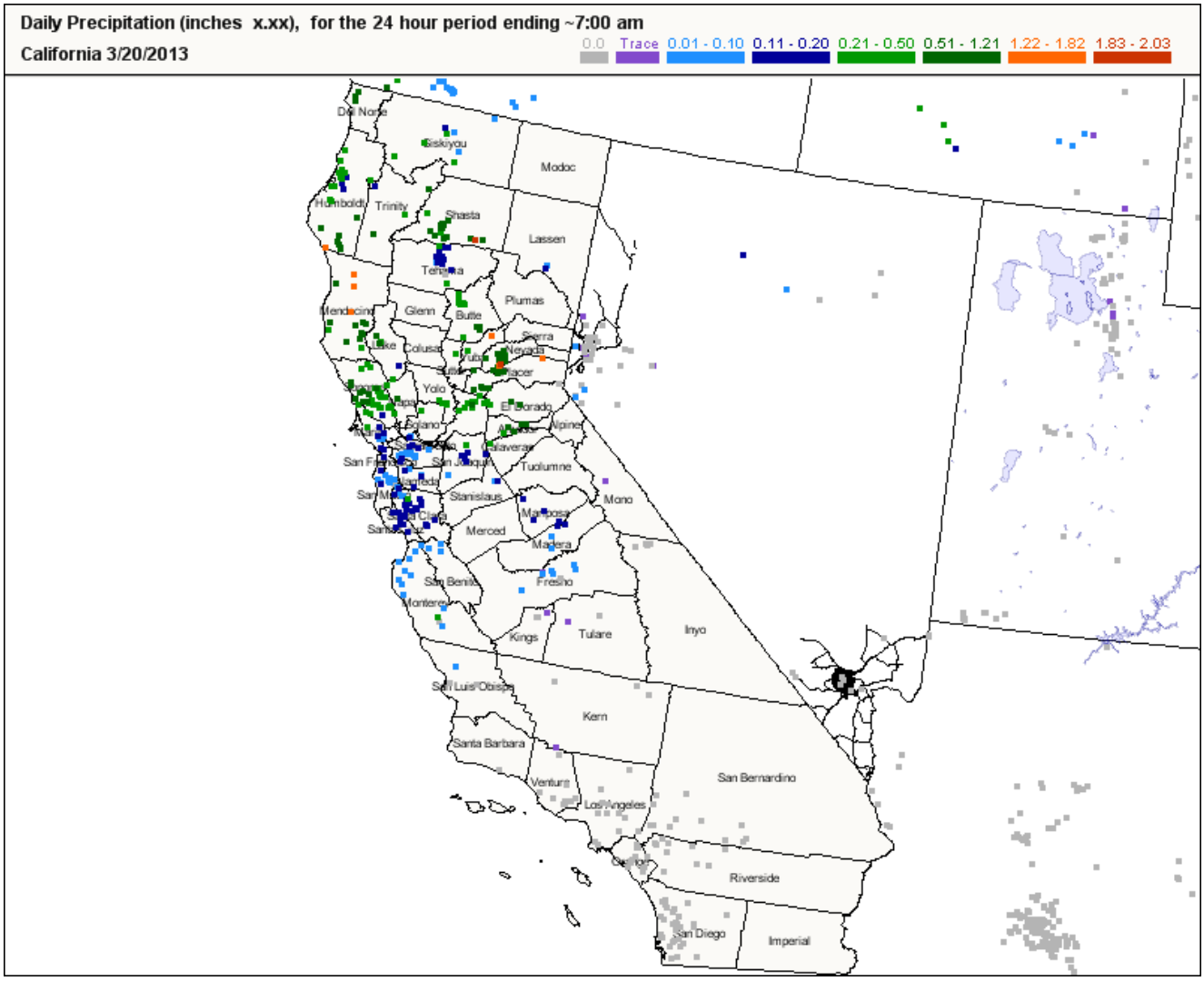





Maximum Temperature Rankings
Jan-Mar 2013
Western Regional
Climate Center
PERCENTILE
RANKINGS
0 1 10 33 67 90 99 100
RECORD COLD
VERY COLD
COOL
AVERAGE
WARM
VERY WARM
RECORD WARM


Minimum Temperature Rankings
Jan-Mar 2013
Western Regional
Climate Center
PERCENTILE
RANKINGS
0 1 10 33 67 90 99 100
RECORD COLD
VERY COLD
COOL
AVERAGE
WARM
VERY WARM
RECORD WARM

CoCoRaHS Map



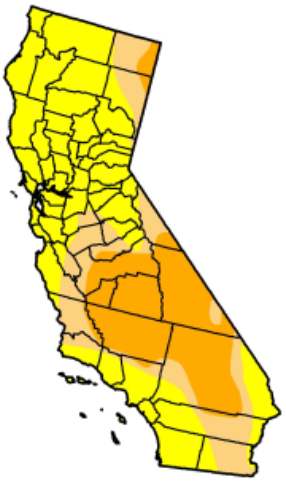
U.S. Drought Monitor

February 26, 2013
Valid 7 a.m. EST

California

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.02	99.98	47.13	26.96	0.00	0.00
Last Week (02/19/2013 map)	15.45	84.55	47.18	23.72	0.00	0.00
3 Months Ago (11/27/2012 map)	6.77	93.23	70.47	28.16	1.14	0.00
Start of Calendar Year (01/01/2013 map)	31.75	68.25	55.32	22.50	0.00	0.00
Start of Water Year (09/25/2012 map)	11.95	88.05	69.41	22.27	1.14	0.00
One Year Ago (02/21/2012 map)	4.77	95.23	67.76	5.06	0.00	0.00



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, February 28, 2013
Brian Fuchs, National Drought Mitigation Center

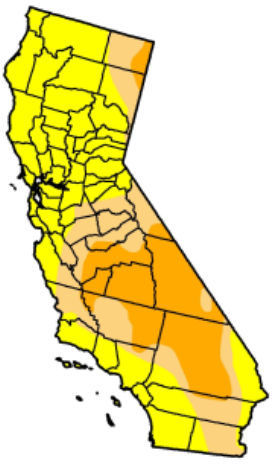
U.S. Drought Monitor

March 26, 2013
Valid 7 a.m. EST

California

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	48.38	24.22	0.00	0.00
Last Week (03/19/2013 map)	12.85	87.15	48.38	24.19	0.00	0.00
3 Months Ago (12/25/2012 map)	30.94	69.06	56.19	25.22	0.05	0.00
Start of Calendar Year (01/01/2013 map)	31.75	68.25	55.32	22.50	0.00	0.00
Start of Water Year (09/25/2012 map)	11.95	88.05	69.41	22.27	1.14	0.00
One Year Ago (03/20/2012 map)	2.22	97.78	89.61	40.14	0.00	0.00



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, March 28, 2013
Anthony Artusa, NOAA/NWS/NCEP/Climate Prediction Center